

# 2018 Annual Report

from the

Integrated Watershed Research Group

at the

University of Northern British Columbia

submitted to

Nechako Environmental Enhancement Fund  
Project Manager: Dan Boudreau

Prepared by Barry Booth, Research Manager,  
in conjunction with  
Drs. Déry, Owens, Parkes and Petticrew

March 7, 2019

## General Project Introduction

The University of Northern British Columbia (UNBC) houses an Integrated Watershed Research Group (IWRG) comprising: Stephen Déry (Environmental Science Program), Philip Owens (Forest Renewal BC Chair in Landscape Ecology), Ellen Petticrew (Forest Renewal BC Chair in Landscape Ecology), and Margot Parkes (Canada Research Chair in Health, Ecosystems and Society). These researchers have worked collaboratively for several years on integrated watershed-based research with an emphasis on the Fraser River Basin and other northern BC watersheds including the Nechako River Basin (NRB). The researchers view integrated watershed research as linking biophysical, chemical, social, and human-health processes to address important environmental, landscape ecology, and community issues. This group is working on Phase 2 of a five-year research program in the Nechako River Basin comprised of three foci that address specific questions.

**1 – Water security and climate change (Déry and students):** Is a warming climate leading to more or less surface water availability in the NRB? What is the impact of anthropogenic versus natural influences on the basin’s water resources, including streamflow amounts and timing?

**2 – Sediment sources and dynamics (Owens, Petticrew and students):** Fine-grained sediment has been identified as one of the main concerns within the NRB, and some key questions are: Where is the sediment coming from? If we identify the sources of the sediment, can we implement watershed management strategies to help control these sources and limit their detrimental effects? Given anticipated future changes in climate and land use in the watershed, how might sediment sources respond to these changes?

**3 – Tools for integration in watershed management and governance (Parkes and students):** How do decision support tools such as watershed report cards, indicator frameworks, and tools to integrate spatially referenced watershed information feed into broader processes of watershed management and governance? How do we build capacity for developing, managing and maintaining decision-support tools that integrate health, ecological and socio-economic parameters to inform watershed management and governance? How do we better understand the relationship between these decision-support tools and ongoing watershed-based science, given their different timelines, orientations and processes?

## Timeline

The IWRG at the University of Northern British Columbia was awarded a \$499,950 contract from the Nechako Environmental Enhancement Fund Society (NEEFS) in December of 2017 to continue Phase 2 of the IWRG research project in the NRB. This contract allowed for the seamless continuation of the initial Phase of the NEEF funded research that terminated on December 31, 2017.

The following text in this report represents the work we accomplished in the initial year of Phase 2 the project (2018).

## Overall Project Management.

### Presentations, meetings, and extension:

- The IWRG Team and UNBC Office of Research held a public event celebrating the launch of Phase 2 of the NEEF funding agreement on March 27, 2018, which was attended by ~ 25 people, including NEEFS committee members, at the Bentley Centre, UNBC (<https://bit.ly/2KXGAbg>).
  - Two Presentations by IWRG team members were made:
    - Stephen Déry provided an overview of IWRG research on behalf of the research team;

- Joseph Gothreau briefly described how his Master’s degree research project had been influenced by involvement and engagement across all three IWRG Themes.
- Two posters were presented at this event relating to work conducted by the IWRG team.
  - Preliminary results from the sub-grid parameterization of snow in the CLASS model. Rachel W. Hay and Stephen J. Déry;
  - Hydrological modeling of Nechako River Basin’s flows. Siraj Ul Islam and Stephen J. Déry.

A summary of press coverage for this event can be found in Appendix 1.

- We did not hold an outreach event in Vanderhoof (or another appropriate location) in the fall of 2018. We will ensure that we hold an outreach event in the fall of 2019.
- As part of the collective contributions of the IWRG, we also continued our collaborative work with the Nechako Watershed Roundtable (NWR) partners, both from a project and a governance perspective, in ways that complement efforts across all three themes. Our work in this area included the following:
  - Margot Parkes has continued her position as UNBC’s representative on the core committee of the NWR. Stephen Déry and Barry Booth, IWRG Research Manager, are her alternates;
  - Barry remains a member of the Technical Advisory Committee with the Nechako watershed strategy that is being developed by the Fraser Basin Council in conjunction with the NWR;
  - Margot, Barry and Stephen participated in the NWR “Technical Advisory Committee” meeting on April 9;
  - Barry and Siraj Ul Islam attended the annual NWR annual meeting in Nautley on November 2. Both provided program updates to the Roundtable.
  - Ella Parker, IWRG/MITACS intern (see details from Theme 3 below), began working with Kim Menounos from the Fraser Basin Council, and Marieka Sax from UNBC’s Cumulative Impacts Research Consortium to staff the NWR Secretariat, including taking on the following tasks:
    - Attending bi-weekly NWR Secretariat meetings to plan meetings and communications (starting in September 2018);
    - Updating the NWR contact list;
    - Assisting with the planning of the NWR Annual Meeting that took place on Nov. 2<sup>nd</sup>, developing email invitations, preparing documents, arranging remote participation, and answering email inquiries about the meeting;
    - Attending, taking notes and handling remote participation at the NWR Annual Meeting that took place on Nov. 2;
    - Writing the initial draft of Annual Meeting Summary Report;
    - Compiling content and designing the NWR Fall 2018 Newsletter;
    - Working with Marieka Sax to develop a Communications Plan for proposal to the Core Committee.
- On behalf of the IWRG, Barry and Margot went to the open house in Burns Lake on June 19, 2018 hosted by the Ministry of Indigenous Relations and Reconciliation and the Cheslatta Carrier Nation.

## Research maintenance:

- We continue to collate documents and existing knowledge (published reports, journal articles, books, etc.) pertaining to work in the Nechako River Basin. These documents will feed directly into Theme 3;
- We continue to refine the IWRG website that features work done under the auspices of this research program/grant.

## Theme Updates

### Theme 1: Water security and climate change (Déry , staff and students)

We have made tangible progress on climate research in the NRB. Our progress so far is summarized below.

#### Reports published, in press, and in preparation:

- In 2018 we published one paper and have submitted one paper for publication and are working to submit a third paper in early February, 2019.

Paper published:

Hernández-Henríquez, M. A., Sharma, A. R., Taylor, M., Thompson, H. D. and Déry, S. J. (2018). The Cariboo Alpine Mesonet: Sub-hourly hydrometeorological observations of British Columbia's Cariboo Mountains and surrounding area since 2006. *Earth System Science Data*, 10, 1655-1672, <https://doi.org/10.5194/essd-10-1655-2018>

Paper under review :

Sharma, A. R. and Déry, S. J. (2018). Climatology of atmospheric rivers landfalling on the Pacific Coast of northwestern North America. *International Journal of Climatology*.

Paper in preparation:

Islam, Siraj Ul, Hay, R., Déry, S. J. and Booth, B. P. Modelling the impacts of climate change on riverine thermal regimes in the Canada's largest Pacific watershed. *Target journal: Scientific Reports*

#### Field work, data collection and analysis:

- The past year marked the third year of operation for our Tatuk Lake weather station. Data collection continues and a website has now been developed to collect and disseminate these data (<http://doi.org/10.5281/zenodo.1195043>). Please note, that data up until 2017 can be freely downloaded from the above website (no password required). For more recent data, please contact Stephen directly;
- We acquired data (discharge, air temperature and water temperature) from various data providers (e.g. Triton/Rio Tinto; Water Office);

- QA/QC<sup>1</sup> and climatology analysis of these data;
- Naturalize the flows of the Nechako River since the construction of Kenney Dam. This allows us to compare the influence of climate change versus regulation on downstream flows and water temperatures on main stem Nechako River;
- Implementation of a water temperature model (Air2Stream) using above data on different river sites in the Nechako River Basin;
- Sensitivity runs of the Air2stream model for different statistical metrics, flow regimes and parameter optimizers;
- Quantification of regulation and climate change impacts on water temperature in the Nechako River at Vanderhoof;
- Literature review of river water temperature research and previous research activity in the Nechako and Fraser River Basins.

### Research extension and outreach

- The Theme 1 team presented two posters at the IWRG/UNBC NEEF funding announcement (see **Overall Project Management** above for poster titles);

- The team gave seven presentations. These were:

Déry, S. J. (2018). The 2017/2018 winter snowpack in Prince George and surrounding area, Winston's Thursday Breakfast Club, 8 March 2018 (invited talk).

Déry, S. J., Islam, S. U. and Sharma, A. (2018). Quantifying the impacts of flow regulation and climate change on streamflow trends in British Columbia's Nechako River Basin, 8<sup>th</sup> GEWEX Open Science Conference: Extremes and Water on the Edge, 6-11 May 2018, Canmore, Alberta, Canada.

Déry, S. J., Guay, C., Hay, R., Islam, S. U., Koenig, K., MacDonald, M., Sharma, A. and Stadnyk, T. (2018). Disentangling the impacts of climate change and human interventions on the hydrology of key Canadian watersheds, Pacific Climate Impacts Consortium, 27 June 2018 (invited talk).

Sharma, A. S. and Déry, S. J. (2018). Contribution of atmospheric rivers to extreme snowfall across British Columbia, Canada, 8th GEWEX Open Science Conference: Extremes and Water on the Edge, 6-11 May 2018, Canmore, Alberta, Canada.

Sharma, A. R. and Déry, S. J. (2018). Rivers in the sky: Climatology of landfalling atmospheric rivers in BC. Climate Science Informal Seminar 2018 Winter session at UNBC.

Déry, S. J., Guay, C., Hay, R., Islam, S. U., Koenig, K., MacDonald, M., Sharma, A., and Stadnyk, T. (2018). Disentangling the impacts of climate change and human interventions on the hydrology of key Canadian watersheds, Canadian Water Resources Association (Manitoba Branch) luncheon, 6 November 2018 (invited talk).

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<sup>1</sup> QA = quality assurance of the data to measure and assure the quality of the data. QC = quality control and it refers to the measures that we applied to each time series to fill the gaps and outliers to make data useable for modeling simulations.

Déry, S. J., Guay, C., Hay, R., Islam, S. U., Koenig, K., MacDonald, M., and Stadnyk, T. (2018). Disentangling the impacts of climate change and human interventions on the hydrology of the Hudson Bay, Nechako and Fraser River Basins, Centre for Earth Observation Science, University of Manitoba, 14 November 2018 (invited talk).

- Ben Pelto, a PhD student in the Geography Department, gave a presentation that incorporated some of the work conducted by Stephen's team. Barry introduced Ben at the talk and highlighted the connections with NEEF.

Pelto, B. Glacier Change and Climate Change in BC. Caledonia Nordic Ski Club February 24, 2018 (invited talk).

## Theme 2: Sediment sources and dynamics (Owens, Petticrew, staff and students)

### Reports published and/or submitted:

- In 2018, we had the following paper accepted for publication, which will be published in the journal in 2019.

Paper accepted for publication:

Owens, P. N., Gateuille, D. J., Petticrew, E. L., Booth, B. P. and French, T. D. (2019). Sediment-associated organopollutants, metals and nutrients in the Nechako River, British Columbia: a current study with a synthesis of historical data. *Canadian Water Resources Journal / Revue canadienne des ressources hydriques*, DOI: [10.1080/07011784.2018.1531063](https://doi.org/10.1080/07011784.2018.1531063)

Paper submitted for publication:

Owens, P. N., Gateuille, D., Petticrew, E. L., Booth, B. P., French, T. D. and Déry, S. J.. Determining contemporary and historical sediment sources in a large drainage basin impacted by cumulative effects: the regulated Nechako River, British Columbia. *Journal of Soils and Sediments*.

### Field work, data collection and analysis:

- Kristen Kieta has joined the Theme 2 team as a new PhD student. Kristen began her thesis program in September of 2018;
- Kristen attended a workshop in Quebec in June 2018 on the MixSIAR unmixing model which she will use during her PhD;
- Kristen and Barry collected suspended sediment samples during the 2018 freshet at Clear Creek, Stoney Creek, Murray Creek and one site on the Nechako main stem (Highway 27);
- Kristen and Barry also collected suspended sediment and source samples inside and outside the Shovel Lake fire. Some of the sampling sites (e.g., Nine Mile and Tatsutani Creeks, Nechako @ Hwy 27 and Nechako @ Dog Creek) have been sampled in previous years. The intent of these samples was to further explore the use of polyaromatic hydrocarbons (PAHs) that are created during fires as a means to identify if sediment from areas impacted by the 2018 wildfires are entering nearby creeks, and thus can be used as "sediment fingerprints". These samples have been sent to SGS AXYS Analytical Services for PAH analyses.

### Research extension and outreach:

- We worked on sharing sediment related projects in the Nechako to our fellow IWRG colleagues and two international conferences:

Owens, P. N., Gateuille, D., Petticrew, E. L., Booth, B. P. and French, T. D. (2018). Determining changes in the sources of fine-grained sediment in a large regulated watershed in British Columbia using the sediment fingerprinting technique. Oral presentation at the European Geosciences Union annual conference, Vienna, Austria, April 2018;

Owens, P.N., Gateuille, D., Petticrew, E.L., Booth, B.P. and French, T. D. (2018). Determining contemporary and historical sources of fine-grained sediment in a large regulated watershed in British Columbia using the sediment fingerprinting technique. Oral presentation at the American Geophysical Union annual conference, Washington-DC, USA, December 2018.

Phil and Ellen visited Dr. David Gateuille (who was a visiting post-doctoral scientist working on the NEEF project in 2014/2015, sponsored by the French Academy of Sciences) at the Université Savoie Mont Blanc in France in April 2018. We worked on the sediment fingerprinting data from Phase 1 and also the manuscript which was subsequently submitted to the Journal of Soils and Sediments (see above).

### Theme 3: Tools for integration in watershed management and governance (Parkes and students)

We continue to develop and trial a spatially referenced watershed portal tool to create a platform to bring together, share and profile existing knowledge and new watershed research. Progress for this theme continued to focus on design and collaborative activities required to develop and test new tools to integrate and share information in the watershed. The development of this theme has been directly informed by the projects described in Theme 1 relating to climate change and resource development in the Nechako and will continue to be informed by the research and results emerging from Theme 2. In addition, we continued to work on watershed governance through our activities with the NWR Watershed Roundtable. Due to the collaboration across themes, some activities in Theme 3 overlapped with Theme 1, including the collaborative work linked to the publications noted above. Joseph Gothreau, a Master's student whose work also straddles Themes 1 and 3 defended his master's thesis proposal: "*Climate change implications for ecosystems and well-being: developing effective geospatial knowledge exchange tools in the Nechako Watershed*". Joseph is also providing critical input into the technical development of the watershed portal.

In 2018 our efforts have focused, especially, on strengthening the application of our 'tools for integration' in conjunction with an expanding collaboration with School District 91 (SD91), including their engagement with the development of the Pacific Streamkeepers (PSK) waterway monitoring, and links with other aspects of the SD91 curriculum, including the First Nations Principles of Learning. Given the overlap between the SD91 area and the Nechako watershed, this collaboration is proving to be very productive in terms of delivering and expanding on Theme 3 objectives.

In direct support of this direction, in September 2018, we hired Ella Parker as our IWRG/MITACS Career Connect intern whose contract continued until the beginning of March 2019. This internship was supported 50% by MITACS funding, 25% from NEEF funding and 25% from other sources. Ella's internship was focused on: participating in work relating to PSK and School District (SD) 91; providing

assistance with development of the IWRG water portal; and acting as a liaison with the NWR, providing support as required.

#### Field work, data collection and analysis, and technical development of portal:

- We continue to refine our spatially referenced watershed portal tools to create a platform to bring together existing knowledge and new watershed research. Development of the watershed portal included:
  - We continue to maintain and expand our Zotero library of material relating to the Nechako watershed. This includes regular searching for articles, reports, etc. through Google Scholar and other search tools. This library is the central storage place for managing items before they are submitted into the portal;
  - We have submitted all preliminary literature to portal (300 + papers) and created shapefiles to provide a geospatial attribute for each article;
  - We continue to build a repository of shapefiles available to support Nechako submission: this being built through the spatial data associated with existing submissions and, where necessary, creating new shapefiles for submissions that do not have spatial attributes;
  - Portal layers that have been added include: decadal wildfire data (1920 - 2017), Nechako decadal mean air temperatures (1950 - 2015), CIRC workshop with SD91 basemaps, Jordan Brubacher's (SFU) anthropogenic disturbance Web Map Service (WMS) map, Nechako Community Well-being Index;
  - Our Intern Ella Parker has been working to merge data layers from Nechako Watershed Health Atlas into the portal, including: Obstacles to Fish Passage, Fish Observation Points, First Nation Communities, BC Biogeoclimatic Ecological Classification Zones, Environmental Monitoring Locations;
  - We have collected spatial data on forest cutblock history for the Vanderhoof Timber Supply Area and are working on securing similar data for the rest of the Nechako watershed. Once complete, these data will be added to the set of portal data layers;
  - General refinement and improvements specifically included the repair to the single point (spatial) bug, so the Nechako Literature Review can now be uploaded;
  - Two research assistants associated with the ECHO (Environment, Community, Health Observatory) Network co-led by Margot have been editing data from the literature review to help speed the process;
  - Joseph Gothreau, a Master's student, conducted a series of scoping conversations and portal focus groups as part of his Master's thesis. These sessions help form the foundation for a workshop with teachers from SD 91 (see below);
  - Margot, Joseph, and Barry conducted a training interaction with colleagues from New Zealand (Gail Tipa) to support interest in adapting the portal for use in NZ catchment/watershed contexts;
  - Scott Emmons, Senior Lab instructor, UNBC GIS Lab, and Joseph, in conjunction with School District 91 teachers, supported a student from Nechako Valley Secondary School (NVSS) on a guided independent study, whereby the student will work with the portal development team on a portal related project that will satisfy his academic requirements;
  - Ella has worked with a series of spatial files to display Streamkeeper data in the portal in ways that effectively communicate learning outcomes and concepts;
  - Ella is trialling different methods of uploading photo and video media into to the portal so that it can be displayed and interacted with in a user-friendly manner;
  - We continue documenting the process on the development of the portal and we are currently drafting a research article relating to this work. A draft of this article is expected early in 2019.

- Development of partnerships with portal user-groups, for future refinement and applications of the portal:
  - School District (SD) 91 and Nechako Environment and Water Stewardship Society (NEWSS).
    - We are continuing our work with SD 91 and NEWSS on how students from the School District can work with UNBC and NEWSS on collecting both ecological data (e.g., riparian health, water quality, etc.).
      - Barry met with NVSS staff on April 20, 2018 to help with the implementation of PSK work at Murray Creek. He also conducted a site visit with staff from Ft. St. James Secondary School on June 5 to determine a potential candidate stream for Streamkeeper work;
      - Scott and Joseph met with Wayne Salewski (NEWSS) on April 20 to discuss and obtain content for the watershed portal;
      - Joseph conducted a workshop outlining the functionality of the watershed portal with SD 91 teachers on a SD 91 professional development (PD) day. Topics covered were: creating forms, creating schemas, data management / privacy, the total records system approach, how to query spatial and non-spatial data, web map services (WMS), and how to integrate field data into the Portal in a manageable way for classes;
      - Margot introduced graduate students in HHSC760 (Field School in Human Ecology) in a site-visit to Ft. St. James Secondary School in May 2018, to meet with and learn about the research efforts developing between SD 91 and UNBC;
      - Margot began working with Deborah Koehn (UNBC School of Education and SD 91) in summer of 2018 to inform the curricular elements of the partnership with SD91, associated with connecting Streamkeepers integrative science work and connections with the First People's Principals of Learning. This work supported development of PromoScience Application in September 2018 (see below) and ongoing collaboration for future work with SD91;
      - Barry and/or Ella attended the majority of the Fall 2018 Streamkeeper sessions including one session in Fraser Lake (October 1), and multiple sessions in Vanderhoof (October 4, 9, 10, 12, 15, 16, 18). During these sessions Barry and Ella provided support in program delivery, made observations for program improvement and conducted debrief session with teachers on two occasions (October 4 and November 16);
      - Ella began working with a team of three high-school students to document the Fall 2018 Streamkeeper sessions for the portal, using the media of film. Under Ella's supervision, the film team collected interviews with students, teachers and community members engaged in the program, in addition to footage of the Streamkeeper session. Ella travelled to Vanderhoof on numerous occasions to assist students with various stages of the film production (October 22, 26; November 16, 19 and 28-30);
      - Barry and Ella met with Casey Litton, teacher from the Nechako Valley Secondary School, in Prince George on July 27 and September 21 to discuss fall Streamkeeper programming. Casey and Ella developed the idea to engage students to create video documentation of the fall Streamkeeper sessions;
      - Ella and Barry attended an announcement of funding from the Centerra Gold Mining Corps to the School District for Streamkeeper related programming. The announcement took place in Vanderhoof on November 16;
      - Ella hosted a short portal familiarization session in the Nechako Valley

Secondary School on November 29, to prepare teachers prior to Joseph's December portal workshop. Five teachers and three students attended the session;

- Ella and Barry attended a SD 91 Pro-D day, along with nine teachers from across the district, on December 3 to participate in the curriculum planning for the Nechako White Sturgeon education unit. Integration of Streamkeepers and Sturgeon curriculum components was discussed, along with discussion of the potential future role of the portal. Afterwards Ella and Barry held a meeting with Casey Litton to discuss SD 91's interest in adapting the portal to become a unifying tool for all their science programming;
  - Joseph conducted a series of training sessions for portal users these have included:
    - ◇ October 22 : Introduction to the basic functions of the IWRG Portal. Participants were an array of ECHO members;
    - ◇ October 29 : Working with forms from start to submission training, Ella Parker, Scott Emmons, and Alex Leamy attended;
    - ◇ November 5 : Spatial Visualization and Mapping Tools training, Ella and Alex attended;
    - ◇ November 19 : A second introduction to the basic functions of the IWRG Portal session, again with an array of ECHO members;
    - ◇ December 17, Introduction to the basic functions of the IWRG Portal. Participants were teachers from SD 91.
  - Joseph has also produced a series of training documents for the following Portal topics:
    - ◇ An introduction to the basic features;
    - ◇ Filling out a form and making a completed submission;
    - ◇ Spatial visualization and mapping tools;
    - ◇ Bulk-loading submissions;
    - ◇ Setting up new users (admin document).
- Nechako Watershed Roundtable (NWR)
- Discussions are continuing with the NWR as to how the UNBC portal may be able to become an important tool for the roundtable. Specifically moving the Nechako Watershed Atlas to the UNBC portal.
- Collaborations to enhance future collaborations with School District 91.
- Members of the IWRG Theme 3 team, SD91 and community partners worked intensively together June-September to submit a proposal for a new phase of partnership, extending on the SD91 portal and PSK work;
  - A proposal was submitted to NSERC PromoScience in September 2018, titled: "*Koh-Learning in our Watersheds: Connecting Aboriginal Education and Integrative Watershed Science in School District 91;*"
  - Work was started in December 2018 for a further application for funding support to the Vancouver Foundation.

## Outreach, knowledge exchange and extension:

- Margot gave two presentations at conferences where she highlighted work relating the UNBC portal and the Theme 3 work in the Nechako Watershed. The talks were as follows:
  - Parkes, M. W., Emmons, S., Gothreau, J. and Booth, B. (2018). Integrative approaches to the land-water-health nexus in islands: Developing next generation geospatial tools within an Environment, Community, Health Observatory (ECHO) Network. 7<sup>th</sup> International Conference on Environmental Future: Humans and Island Environments, 16 – 20 April 2018, Honolulu, Hawai'i.
  - Parkes, M. W. (2018). Integrative approaches to health, ecosystems & society: New tools and processes to address the cumulative determinants of health impact, and the land-water-health nexus. SESYNC SYMPOSIUM, Boundary Spanning Advances in Socio-Environmental Systems Research. June 12, 2018, Annapolis, Maryland, USA.
- Barry, on behalf of Margot gave one presentation at the Nicola Symposium: Collaboration in a Sensitive Watershed. The talk was as follows:
  - Parkes, M. W. (2018). Equity, ecology and well-being in watersheds: Lessons from integrative approaches to knowledge and governance at the land, water, health nexus. Nicola Symposium: Collaboration in a Sensitive Watershed, February 1, 2018 .
- Margot and members of the IWRG team (Barry, Joseph), shared information about the IWRG portal and related work as part of collaborative activities with related Research Teams:
  - Team watersheds events, as part of the Environment, Community, Health Observatory Network. This included:
    - providing brief introduction at the Team Watersheds webinar on April 11;
    - Planning and preparation for participation and engagement at the ECHO Annual meeting, July 31-August 2.
- Barry and Margot participated in the Cumulative Impacts Research Consortium event entitled “Environment, Community and Health Impacts of Resource Development in Vanderhoof and the Surrounding Area” in Vanderhoof, April 26, 2018.
- Margot and colleagues published a paper that is directly related to Theme 3 work in the Nechako Watershed, including collaborations with NWR and related work:
  - Gislason, M. K., Morgan, V. S., Mitchell-Foster, K., & Parkes, M. W. (2018). Voices from the landscape: Storytelling as emergent counter-narratives and collective action from northern BC watersheds. *Health & Place*, 54, 191–199.  
<https://doi.org/10.1016/j.healthplace.2018.08.024>

## Appendix 1. A summary of press coverage from the March 27 Phase 2 launch

Prince George Citizen

<http://www.princegeorgecitizen.com/news/local-news/new-funding-announced-for-unbc-research-of-nechako-river-1.23215331>

My Prince George Now – Vista Radio Prince George (Country 97, 94X FM The Goat)

<https://www.myprincegeorgenow.com/70953/funding-being-provided-to-researchers-studying-nechako-river-basin/>

CKPG-TV

<https://ckpgtoday.ca/article/522124/unbc-research-group-gets-1-million>

Prince George Daily News

<https://pgdailynews.ca/index.php/2018/03/28/research-looks-at-climate-change-effects-on-the-nechako-river-basin/>

Burns Lake – Lakes District News newspaper

<https://www.burnslakelakesdistrictnews.com/news/nechako-river-basin-study-gets-funding/>

Vanderhoof – Omineca Express newspaper

<https://www.omincaexpress.com/news/nechako-river-basin-study-gets-funding/>

Kelowna Now (online publication)

[https://www.kelownanow.com/watercooler/news/news/Prince\\_George/UNBC\\_researchers\\_receive\\_grant\\_to\\_continue\\_Nechako\\_River\\_basin\\_research/](https://www.kelownanow.com/watercooler/news/news/Prince_George/UNBC_researchers_receive_grant_to_continue_Nechako_River_basin_research/)

## Financial Summary

### 2018 summary

Our financial summary from UNBC Finance is attached<sup>2</sup>. You will note that we spent in excess of the planned amount of \$200,000 (50% NEEF, 50% UNBC matched) in first year of research. This 'overspending' was due to a small overspend of NEEF funds (\$101,502.16 vs \$100,000) required to complete our first year of research and a significant over match of funds secured for salaries in 2018 (\$159,170.90 vs \$100,000). As per our contract, this overspend of NEEF funds will be managed by UNBC as overspend, as discussed with the UNBC Office of Research and the Finance Office.

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<sup>2</sup> Please note that receipts related to expenses are available from UNBC Finance upon request.



**Funding Agency:**

Nechako Environmental Enhancement Fund  
 BOX 101  
 Prince George, BC V2L 4R9

UNBC Fund # 28532  
 UNBC Contract # RC17-3439

Project Title: "Integrated Watershed Research in the Nechako River Basin: Phase 2"

Statement of Cash Receipts and Expenditures  
 For the period from January 1, 2018 to December 31, 2018

Opening Fund Balance		\$0.00
Funds received in the reporting period		\$50,000.00
Amount of matching funds in the reporting period	Salaries	\$130,978.48
	Expenses	\$28,192.42
Funds Available		\$209,170.90

<b>LABOUR</b>		
Research Associates	\$93,733.87	
Research Assistants	\$38,604.53	
Graduate Students	\$31,562.11	
Part-time Project Manager	\$40,135.88	
<b>TRAVEL</b>		
Travel (Conferences)	\$7,350.38	
Travel (Field work)	\$10,644.67	
Travel (Workshops and Outreach)	\$851.28	
<b>EQUIPMENT, ANALYSIS and SUPPLIES</b>		
Field equipment	\$874.32	
Laboratory Analysis and Supplies	\$10,137.03	
Materials and Supplies	\$3.14	
<b>PROMOTIONAL MATERIAL</b>		
Publication and Poster Costs	\$525.67	
<b>UNBC O/H</b>	\$26,250.00	
<b>Total expenses</b>	<u>\$260,673.06</u>	\$260,673.06
Fund Balance at December 31, 2018		<u><u>(\$51,502.16)</u></u>

Stephen Dery  
 Stephen Dery Professor  
25 FEB. 2019  
 Date

Colleen Smith  
 Colleen Smith Associate VP, Financial Services  
Feb 26 / 19  
 Date